CLAIMS

We claim:

1. A transgenic mouse model whose genome contains at least one mutation that substantially reduces expression of the native mouse *Smn* gene and carries at least one human genomic DNA sequence that at least partially compensates for the reduced expression of said *Smn* gene.

2. The transgenic mouse model of claim 1, said mouse model genotypically and phenotypically mimicking human spinal muscular atrophy patients.

3. The transgenic mouse model of claim 1, whose genome contains at least one knockout mutation in the *Smn* gene and carries at least one copy of human SMN^c gene.

4. The transgenic mouse model of claim 3, wherein the alleles of said *Smn* gene are homozygous for said knockout mutation.

5. The transgenic mouse model of claim 3, wherein the alleles of said *Smn* gene are heterozygous for said knockout mutation.

6. The transgenic mouse model of claim 3, said mouse genotypically and phenotypically mimicking human spinal muscular atrophy patients.

7. The transgenic mouse model of claim 4, said mouse genotypically and phenotypically mimicking human spinal muscular atrophy patients.

8. A method of generating a transgenic mouse model of spinal muscular atrophy, comprising the steps of:

(a) introducing a mutation in the genome of a mouse to reduce the expression of mouse *Smn* gene; and

(b) introducing a human genomic DNA sequence into the genome of said mouse to rescue said mouse from the conditions created by reduction in *Smn* gene expression.

9. The method of claim 8, wherein said mutation is introduced by replacing *Smn* exon 7 with a hypoxanthine phosphoribosyl-transerase cassette.

10. The method of claim 8, wherein said human genomic DNA sequence comprises a human *SMN*^{c} region, which includes centromeric *SERF1* and part of centromeric *NAIP*.

11. The method of claim 9, wherein said human genomic DNA sequence comprises a human *SMN*^{c} region, which includes centromeric *SERF1* and part of centromeric *NAIP*.

12. A method of testing for therapeutic efficacy on spinal muscular atrophy conditions, said method comprising:

(a) applying one or more of therapies to be tested to a transgenic mouse model of claim 6; and

(b) determining whether one or more conditions characteristic of spinal muscular atrophy have changed as a result of application of said therapy or therapies.

13. The method of claim 12, wherein said therapy is gene therapy which corrects genetic defects by changing genomic DNA sequences.

14. The method of claim 12, wherein said therapy is drug therapy which alleviates pathological conditions characteristic of spinal muscular atrophy by using one or more chemical compounds.

15. The method of claim 12, wherein said transgenic mouse model is made according to claim 7.

16. The method of claim 15, wherein said therapy is gene therapy which corrects genetic defects by changing genomic DNA sequences.

17. The method of claim 15, wherein said therapy is drug therapy which alleviates pathological conditions characteristic of spinal muscular atrophy by using one or more chemical compounds.

18. A method of testing the accuracy and sensitivity of diagnostic methods for spinal muscular atrophy by using a transgenic mouse model of claim 6 as a positive control of the conditions of spinal muscular atrophy.

19. The method of claim 18, wherein said transgenic mouse model is made according to claim 7.

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